



# Carolina DX Association

May 1997

## The Pileup

Newsletter of the CDXA

AA4R Bill Parris President  
W4WN Cliff Wagoner Vice-President  
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### The President's Page

I hope all of you have been able to take advantage of the recent good weather and completed some of your outdoor projects, such as lawn, shrubs, and maybe a little antenna work?

Like many of you, I was real disappointed when BS7H, Scarborough Reef, ceased operation after only three days. Even though I've had "mixed emotions" about referring to Scarborough Reef as a "country", I hated to see a DX-pedition like this run into difficulty. Unfortunately, considering the political situation in this region, BS7 may not be back up for a while. I hope you were able to make it into the log this time, especially if (like me), you did not QSO the previous operation. I was mentally "tuned up" for this one and had high-hopes of hearing them on some of the lower frequencies. But no such luck, as propagation really "stunk" during most of their stay on the rocks. Well, who'll go there next?

A number of members have mentioned they would like to see more real-time DX news in this newsletter, so I have put together a small "Upcoming Events" listing in this issue for your consideration. It really is not practical to have extensive "latest DX spots" in this newsletter. It is, after all, a monthly publication. And there are numerous on-line services which provide such information better than we can here.....including our own PacketCluster.

Please remember the lunches at Shoney's on Woodlawn Road in Charlotte each Wednesday. Come by and join the fun and companionship!

As always, good DX!  
-AA4R

### UPCOMING EVENTS

Currently	3W (Vietnam) 3W6AR by JA2EZD, all bands, CW & SSB
	5H (Tanzania) 5H3HG by N5HG, 15-80 m CW & SSB, for about 14 months
	FT5Z (Amsterdam Is.) FT5ZG now has a new amplifier, QSL via F5RQQ
(Feb-Nov '97)	ZS8IR leaves Marion Is. at the end of May '97
	3XY3A will be in Guinea through June 15, QSL via F5IEV
	S21B (Bangladesh) now on 20M SSB, QSL via W4FRU
May 20-27-	3C0DX (Annobon Is.) large Spanish group, three stations, all bands/modes
May ?	9N (Nepal) 9N1SM, 20 & 40M only, operated by VE5SM
May 24-25	CQ Worldwide WPX CW Contest
May 28-30	BV (Taiwan) JH3IMR/BV & JA3TJA/BV, 40 - 10 M RTTY & SSB
May 31-Jun 2	3A (Monaco) IK1QBT/3A CW only all bands, IK1CJO/3A RTTY only 40 - 15M
May 31-Jun 7	OJ0 (Market Reef) German group, SSB only, QSLs automatically sent via Bureaus
June (late)	70 (Yemen) a "possible" operation by HA5PP
June 13-20	TF (Iceland) YL operation by IT9ESZ/TF & LA6ZH/TF, CW & SSB
June 14-16	ARRL June VHF Contest
June 26-Jul 3	CY9AA (St Paul) CW & SSB, 160 - 2M
June 28-29	ARRL Field Day
July 12-13	CQ WorldWide VHF Contest
July 21-24	3A (Monaco) SSB only operation by ON5FP/3A & ON6NN/3A

## EDITORIAL

Spring and a young ham's fancy turns to thoughts of...antennas, of course, to paraphrase the immortal words of Lord Tennyson, with just a wee bit of workshop modification thrown in...call it for good measure...which is a bit of Shakespeare as well as good punning, considering the topic is antennas....

Our weather has been terrific. The early morning conversations on 147.18 have been marked by enthusiasm and often grandiose plans for antenna and tower work in the area. Great news. Good fun. And what I like to call the real fun part of ham radio—the gathering together of kindred souls or spirits for shared adventures. For each and every antenna project can be just that, an adventure. A trip into the unknown for some of our newer hams (believe it or not, we have some in the CDXA now, and this note's an official “welcome” to them), or a comforting journey into the common place arena of problem-solving for the long-time antenna man.

This month's *Pileup* focuses on antennas. Not with articles you can copy exactly, but with research or “get you thinking” articles. The sort of thing you'll bring to mind as you're walking around your own “back 40” and wondering what you could do to be a bit louder on the bands. The sort of thing you can modify and try out on your own. The sort of thing that makes ham radio, and DXing in particular, an adventure.

This editorial is also where I simply state, once again, that this is YOUR newsletter. After four issues (which several of you had glowing things to say about at the Charlotte Hamfest), I am still not getting anything from the membership. (N4UH is excused, for obvious reasons, from this diatribe.) I'm looking for suggestions, ideas, articles, or anything else. It's your newsletter. It's not the K4ZA newsletter. He merely puts it together.

What sort of things would you like to see? What should we be doing? What can we do to make the expense (which can be considerable) incurred in putting such a piece of work together each month more viable—to the CDXA? How can we make *The Pileup* better? I am stunned by AA4R's note that “a number of members have mentioned they would like more real-time DX news” in *The Pileup*. There's a basic contradiction here—it's a monthly, after all. Please note my new address. I've moved. Nearer the N4ZC contest station, out in the country (an isolated location, suitable for antennas). I hope to be back on the PacketCluster soon. My address, telephone number and e-mail address appear on the back page of this newsletter. I figure if everyone spent just one minute of time in replying (simply answering the above questions, for instance), we would have enough information to publish this newsletter for the next two years easily. Regardless of who edited it. This means I not only *want* to hear from you, I *need* to hear from you. Having just returned from the Dayton Hamvention, my enthusiasm level is pretty high. In fact, it's dangerously close to saying let's forget about doing a newsletter for a club with no really active, interested, enthusiastic and energetic or contesting hams. Why not put all my energy into building my own station? In this day-and-age, a newsletter of “DX spots” seems pretty useless to me. What do *you* think? Having said all that, let's look at some antennas.

--K4ZA

## NOTES ON RHOMBIC OPERATION AT N4UH

K4ZA has asked me to comment on the operation of my terminated rhombic antenna, which covers all frequencies from 3.5 MHz to 29.5 MHz. It is centered on London, England, and when reversed, on Pitcairn and Macquaire Islands. It has a leg length of 277 feet, an average height of 70 feet, and has an acute angle between the driven wires which is variable from 20 to 50 degrees. Changing the configuration of the rhombic is necessary to cover the specified frequency range. A rhombic maintains its directional characteristics over approximately a 3-to-1 frequency range. The ability to change configuration is accomplished by two motors on the side towers. When these motors are energized from the shack, the side insulators are allowed to move toward the center of the array—pulled inward by a 250 pound weight hung from a pulley at the top of the end tower. Overall size of the rhombic is approximately 550 feet X 250 feet. The antenna was designed to have two wavelengths per leg on the 40M band, and the included angle at that frequency is 50 degrees with the side insulators at the side towers. The 20 degree angle is to give optimum operation in the 10M band.

A terminated rhombic has a physical beginning and end—unlike most antennas which stop at the radiating elements. In this description, the antenna system starts at the transmitter with a short run of coaxial cable to a 50 to 200 ohm balun. Through a series of exponentially tapered transmission lines,  $\frac{1}{2}$ -wavelength at the lowest operating frequency of 3.5 MHz, an impedance of 800 ohms is reached at the two ends of the rhombic. In the center of the rhombic system, and at a 600 ohm line impedance level, is the switching network—to reverse the direction of fire. It is here that a 600 ohm, 118 watt non-inductive terminating resistor (military type CX) is placed. The resistor is a tube, one foot in length, and one inch in diameter. It was given to me by K1AA 20 years ago, and I do not know where to get a replacement. (Incidentally, if anyone wants more information on my antenna, which I call "a controlled vertical radiation rhombic," it is described in *ham radio*, for March and April, 1985.)

Design work of its radiation characteristics was first determined by the ELNEC antenna program. However, the following numbers were obtained from the recently-purchased VOACAP propagation prediction program, which has an excellent antenna library called HFANTENNA. Their terminated rhombic was used to develop the following chart using the physical configuration of my rhombic. Its calculations are much faster than EZNEC, a newer version of ELNEC.

FREQUENCY MHz	GAIN dBi	VERTICAL ANGLE	RADIATION BEAM WIDTH	HORIZONTAL RADIATION BEAM WIDTH
3.8	7.4	45	30	56
7.2	13.5	26	25	26
10.1	16.6	18	16	20
14.2	19.5	12	14	14
18.15	20.3	9	10	10
21.3	19.6	7	9	8

The above-chart information was done using the 40M configuration. At this point, the vertical beam angle was going negative, and the beam had started to split. The configuration was changed to a 15M array, with the following results.

21.3	20.5	9	9	12
24.93	22.1	8	8	10
28.5	23.3	7	7	10

A dipole has a gain of 2.14 dB over an isotropic radiator. If an antenna has a gain of 7.4 dBi, it has a  $(7.4 - 2.14 =) 5.26$  dB gain over a dipole in free space. To determine the ground effect of these antennas is beyond me, but some indication of the awesome gain of an 8-wavelength/leg rhombic can be seen by its 10M performance above. I believe leg lengths greater than 8 wavelengths will produce a beamwidth too narrow for reasonable coverage. I compared the above information with an EZNEC NBSYAGI--a three element Yagi analysis which shows a free space gain of 9.7 dBi.

For that antenna to approach the gain of the rhombic on 20M (assuming a 3db increase for each doubling of the number of elements), would require a 24 element Yagi to give 18.7 dBi. Just for fun, a 20 dB gain is equivalent to a power ratio of 100. So a 10M signal from a 1kw transmitter would have an effective radiated power of 100,000 watts. While I don't believe such numbers entirely, the signal can bring gasps from receiving stations in Europe when 10M has been open.

My experience on the bands with the rhombic is as follows:

- 160M—mostly vertical radiation because each leg is only ½-wavelength, and nothing jibes from each leg.
- 80M—better than dipoles or inverted vees, but not as good as a 4-square or 2-element Yagi.
- 40M—equal to or better than a 3-element Yagi.
- 30M—I love to talk about the time I called CQ with 100 watts on a “dead band” and someone sent “LID,” then a European station came back, calling me.
- 20M—I can hold and run a frequency during major DX contests with my 500 watts.
- 17M—I never run over 100 watts and create “pileups” with a CQ.
- 15M and above--I love the RSGB 21/28 MHz contest because I have little competition.

With a rhombic on Europe, which I have, and a reversible rhombic on Japan/South America, one would have an almost ideal set-up. Unfortunately, I can't rotate the rhombic, so rotatable antennas are still necessary for all the bands. I have a TH7 at 60 feet for 10-20M, a ¼-wave vertical for 40M, a ¼-wave sloper for 80M, and a Lazy-U for 160M. But I love talking to Europe and having a rhombic was a dream for my retirement years. I'm happy it's such a success.

--N4UH

Want more Rhombic antenna information? Try the Rhombic antenna home page @  
<http://www.neca.com/~cumming/6amtext.html>

## ***A Conversation with W3LPL***

### **1997 Dayton Hamvention**

K4ZA: Frank, tell us about your station, especially how and why you've focused so much attention on antennas.

W3LPL: Like a lot of hams who got into the hobby in the 50s and 60s, I got into contesting through Field Day, and in my case, I operated at a Field Day site before I was actually licensed. This group was particularly experienced hams, who enjoyed antennas, and they had some really good ones! Their sideband station had a KWM-1, and a triband quad to go with it, which they constructed there, while I was there; and the CW station, which was a Viking II and an NC-300, had its antenna suspended between a 90-foot oak tree and a sign truck. This was a full-size two-element lazy-H for 40 meters, which they also built there. So my introduction to ham radio was with guys who were really into building antennas. Not surprisingly, when I got licensed, I started to build my own antennas, really trivial ones to start with, and they performed really poorly... I went through a whole series of antennas, from simple dipoles to verticals and elevated ground planes...

ZA: With this as background, let's talk about contesting...did this group consider FD a contest, and that was your introduction? Or was it something else? What can you tell us about that?

LPL: Yes, it started with that same Field Day. In our club, in that particular FD, in 1959, those guys were out to try to win. They did not, but they did very well. And after that particular FD, remember the guys in this club were competitive, and they participated in the quarterly CD Parties, which attracted a lot of the best operators. Guys with moderate stations, but who really enjoyed the high speed CW operation. W1NJL, who's now K1VR, was one of those guys who was real active in that. So, it was FD, and these CD Parties, where you could be competitive, that got me involved in contesting. I didn't do any DX contesting of any consequence during that period.

ZA: Good. Let's leap ahead to today, where you ARE doing some DX contesting, of some consequence. Tell us about building antennas for that. Especially about the transition from say, building antennas empirically, to today's work with computer modeling, which I know you use extensively.

LPL: When I came into the PVRC, in 1969, I remember very well, one day, watching Lenny, W3GRF, tune up a 20-meter beam, six feet in the air on the side of his tower, using a VSWR bridge. He changed the director and reflector lengths while he did this, and it was extremely empirical. But designs, in those days, were ones you took out of the *ARRL Handbook*, and using what you might call "gut feel," using whatever you had available and so on, you built antennas, some of which worked well, and some didn't. Some were abysmal. One of the ones I remember best was when I built a 6-element 20-meter beam, on a 72-foot boom. That antenna never worked, at all. I think the directors wound up too long, so it never had any forward gain at all. After that disaster, I decided to build ALL my antennas on proven designs. And I went to the W1HDQ 6-element 6-meter beam as a baseline because I knew he had done work on a backyard range to prove the antenna's performance. So I switched all my antennas to that kind of design and was very successful. The next step, after that, was the discovery of a Ph.D. thesis at Harvard for antenna work on mainframe computers. I got a copy of that thesis, re-coded software, and with N2FB, ran it on a mainframe computer using a card deck, and analyzed that W1HDQ Yagi. I didn't really change the design based upon that work, but that was my first experience with computers in design, and that was in about, oh...1976, when I got that software running. Shortly after that, a couple of guys found out I had it, so ultimately I gave a copy of the software—the recoded software—to K1GQ, who in turn gave it to W1RR, and they both worked on it so that it would run on a PC, as well as on a mainframe. This was in the early 80s, when PCs with decent power were starting to become available. So that was the sequence—from the Harvard thesis, to N2FB, to K1GQ, to W1RR, and then it went on to a W8, and after that, as you know, computer modeling really got started. Now, all HF antennas a competent ham would build are all based on computer models. And they're really sophisticated modeling programs.

**W3LPL, continued**

ZA: Which one are you using?

LPL: I use YO and EZNEC, and they both have different characteristics. YO is a design program. You put in a starting point, and YO will actually take that starting point, and evolve the design, seeking out an optimum solution. The disadvantage to YO is that it doesn't handle stacked antennas particularly well at all. It will really only deal with them in free space. So in terms of stacked modeling, I'll take the results of YO, and put them into EZNEC, and that deals with the interactions between the antennas as well as the interaction of those antennas and the ground.

ZA: If one wanted to start learning about computer modeling of antennas, what would you recommend? Should one take an existing antenna, say a commercial design, and input the design into one of these programs, in other words, how would one start out? How would you suggest one start to learn these programs?

LPL: I think the best way, once you have the software...well, the software comes with some models already set up for popular antennas, particularly YO. Many of the most common antennas are already set up in that program. EZNEC to a lesser degree. But you can also get copies of models for a whole series of programs from people who've done it, like myself and others. Also from the Internet. Probably the best bet, if your interest is Yagis, is to buy YO, as a first step. If your interest is modeling other types of antennas, say Beverages, phased arrays which are not Yagi-based, quads and so forth, EZNEC or AO, either one, is a good choice.

ZA: How would one start?

LPL: First, get comfortable with the program. Get comfortable with using it. Using a pre-existing model. Then, move to modifying that model. Then, when you're comfortable with modifying the model, then move to trying to create your own models after that. That's a logical way to go, and a better way than, say, just diving into the program. I think that would prove to be really frustrating, particularly for someone who's not real comfortable with math.

ZA: Great. So, using these programs eliminates the empirical testing?

LPL: Absolutely! That's a terrible way to go, because you cannot possibly conceive of all the interactions which can occur. I think it's a good idea to have a good grasp of what's going on—with antennas—so you don't get off into crazy designs which don't make any sense—you want to start from a rational starting point. All these programs expect a starting point that's reasonable.

ZA: Sum up for us by telling us what's next at the LPL station?

LPL: Don, you probably remember the microburst which came through my place three years ago...wiping out the antennas, but leaving the towers standing. Well, I did not put the stacked arrays for 10 and 15 back up. There wasn't any reason to do so, since the sunspots were vanishing. So, the next step is to put those antennas back up. We hope to put four stacked sixes on 15, toward Europe. And another completely separate pair of stacked sixes, fixed on Europe, to give the higher angle radiation. That'll be the big project for this year. We just finished a big project—a four square on 160. It's been hugely successful; it's like we moved 300 miles Northeast. We've gone from struggling to hold our head above water on the band, to being one of the better stations on the band. I'm hoping to get the time to add the second, parasitic driven element to the 40-meter beam as well. This K3LR and WA3FET-based design is excellent.

ZA: Thanks, Frank, I'm sure the readers will enjoy this. Maybe it'll inspire them...

LPL: Good luck with your new place, too...it'll be good to finally hear a big signal from North Carolina...(laughs)

*K4ZA operated W3LPL's 20-meter station in the CQ WW & ARRL DX Tests while living in Maryland for five years. He also operated in, & won, the CQ 160-meter contest—never once feeling he was struggling. He spent some time doing tower/antenna work there, too, & misses the enthusiasm & drive of the Potomac Valley Radio Club membership—one of the country's premiere contest clubs.*

## *The Back Page*

*One of the advantages of attending the Dayton Hamvention, besides all the fun stuff, is learning about products or processes which can make your life easier, better or more fun. Bernie McClenny's (W3UR) new venture, THE DAILY DX, may just do all of these.*

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Announcing the beginning of the new preeminent Internet DX bulletin, THE DAILY DX, written and produced by Bernie McClenny, W3UR. THE DAILY DX is the newest, fastest and most innovative way to get up-to-date HF DX information. THE DAILY DX provides the latest DX information collected from a world-wide network of sources. Raw DX data is put in a user-friendly format to meet your DXing needs. You will receive information about future DX-peditions, QSL info, propagation forecasts, IOTA news, post DX-pedition write-ups, and more. You will receive instantaneous DX news without having to rely on your postal service. THE DAILY DX will be e-mailed to your location five days a week, Monday through Friday, 50 weeks a year. Other bulletins may take two to five days to reach you. Now you can receive DX news before it's out-of-date. Subscriptions to THE DAILY DX are \$49.00 per year for 250 issues, that's less than 20 cents an issue. If you are not completely satisfied, we offer a full money back guarantee after trying THE DAILY DX service for only 30 days. Please visit THE DAILY DX Homepage at URL <<http://www.wdn.com/thedailydx>> for further information. Subscribe now to THE DAILY DX for the fastest DX information source. To receive two weeks of free trial service, send an e-mail to <[bernie.mcclenny@mail.wdn.com](mailto:bernie.mcclenny@mail.wdn.com)> with your name, callsign and e-mail address.

**—W3UR**

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### **An interesting (and up-lifting, if you live in a typical, modern-day community) bit of Internet news....**

The good news: PRB-1, and its Massachusetts state law adoption into our General Laws here, have won one for a ham seeking a 115 foot tower on Cape Cod. The bad news: The ham is K1ZM, the location is wonderful, and he's going to be very loud in Europe on 160M, as well as any other band he cares to use. In my view, the key to the win was the documentation provided by Briggs (K1ZM) to show that 115' was necessary to accommodate his communications need. Again in my view, (showing that) low take-off angles for 20 meters were useful, but nowhere near as useful as showing that a nearby ridge between K1ZM and his closest PacketCluster (TM) node had to be overcome. Kudos to Briggs for incredible thoroughness in preparing the file. When you read below that "the Building Commissioner (sic) exhaustively researched ...." You should understand that the phrase means he made exhaustive demands on K1ZM. As any lawyer will tell you, good preparation helps to promote good luck.

**--Fred Hopengarten K1VR**

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### **PacketCluster News**

Let's all try & pay attention when using LOCAL & ALL messages. For instance, looking for a good local plumber or offering to have someone come to your QTH & pick up free firewood probably won't really mean much to someone in Atlanta, Birmingham, Nashville, or even Paducah. It is, after all, 550 miles to Paducah. Even expecting or thinking someone might drive 285 miles from Norfolk to get your wood is stretching things just a bit. ALL messages go to 31 nodes in the system. A message of local interest should only go to LOCAL. Stop & think before you start typing, please.

**PacketCluster News, continued**

A few words on the GO-LIST on the Cluster. The GO-LIST was originally sold & sent as a monthly subscription, via the mail. To make it easier & less expensive to subscribers, W6GO instituted "GO-LITE," a yearly subscription available via the W6GO BBS or PacketCluster. Each month, SYSOPs agree to upload/download DX spots & QSL information via landline to the W6GO BBS. The node uploads a file of QSL MGR info derived from PacketCluster & user updates. Also, we download the latest QSL MGR information to our node, which you can then access with the command SH/QSL CALL.

Many, who paid for the GO-list via the mail, found they could get it free on PacketCluster. Since hams are notorious cheapskates, W6GO found it wasn't worth his time having people taking his product for free. He was about to do away with the service when AE4AP stepped in. After a year, Paul also concluded the work wasn't worth it. K1XN has now agreed to give it a try. We have the same agreement with K1XN we had with W6GO. The command SH/GO SUBS will show you the people who are paying for this service at the N4ZC node. The command SH/GO HELP will provide more info. I point out how we get this service so you will understand how it works, & why we need to continue making it worth K1XN's time & effort. Would you continue operating a business if 90% of your product went to people who didn't pay? I don't expect everyone to support it, but if you feel—as I do—it's the right thing to do, please send \$10 to K1XN for GO-LITE. Tell him your home node, & your serving node (for those K4MD-users, it's N4ZC) so we get credit. (I don't get a penny of the money; I simply want to make sure the service continues.) Send your check to: John Shelton K1XN 106 Dogwood Hills Drive Paris TN 38242

**-N4ZC**